Ministerio de Defensa Nacional
Dirección General Marítima
Autoridad Marítima Colombiana

Vice Admiral ***José Joaquín Amézquita García***
General Maritime Director

ANH
AGENCIA NACIONAL DE HIDROCARBUROS
COLOMBIA

Ministerio de Defensa Nacional
Dirección General Marítima
Autoridad Marítima Colombiana

Technical WORKSHOPS

COLOMBIA ROUND 2021 ANH

El futuro es de todos Minenergía

Caribbean and Pacific Mega Areas

The Colombian National Hydrocarbon Agency, supports the Offshore Exploration Program thru the General Maritime Authority
Dimar

Friday, June 18th 2021

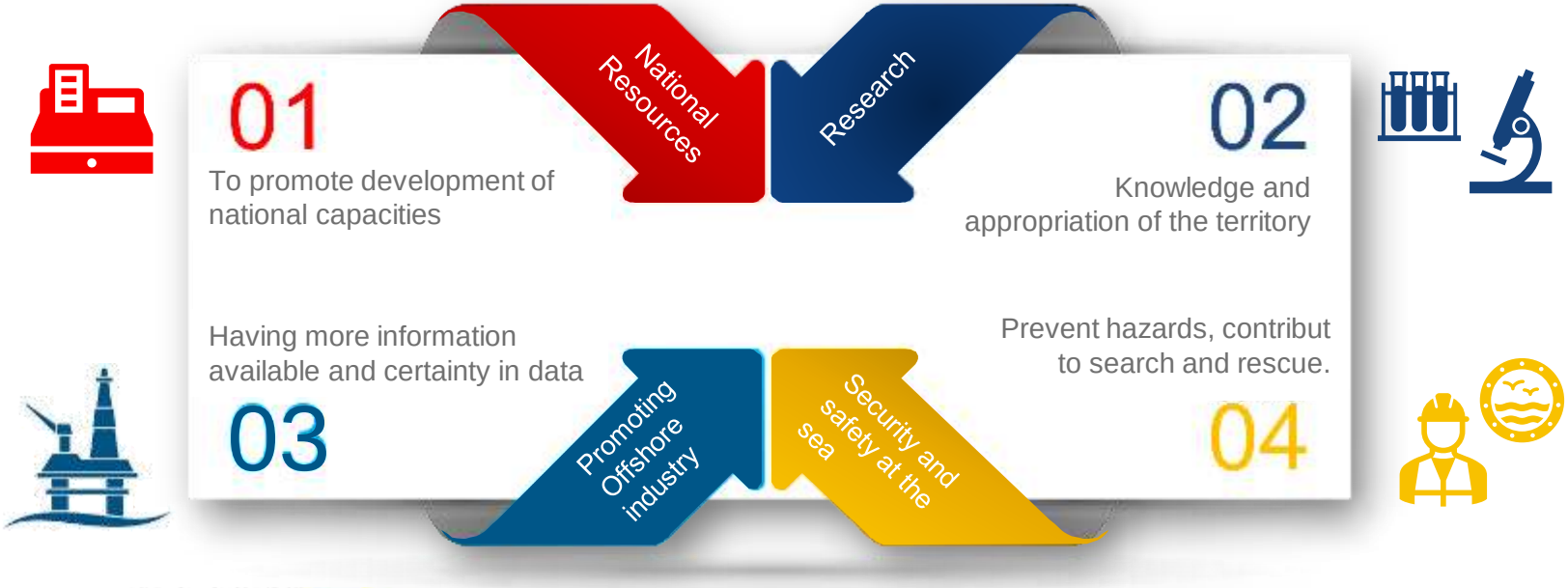
"Consolidemos nuestro país marítimo"

What is DIMAR?

It is the Colombian Maritime Authority in charge of executing the government's policy in this matter, with a structure that contributes to the ***strengthening of the national maritime power***, ***ensuring the integral maritime safety***, the protection of human life at sea, ***the promotion of maritime activities and the scientific and technological development of the Nation*.**

DIMAR´S Jurisdiction

Strategic alliance for development



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"Consolidemos nuestro país marítimo

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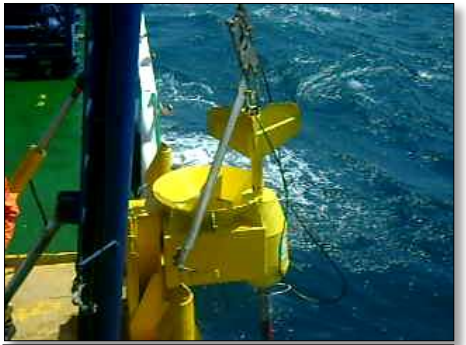
MINDEFENSA

GOBIERNO DE COLOMBIA

"Colombia thru the General Maritime Directorate, develops the first deep water complete environmental seep hunting program in history with his own crew, and research vessels"

Luis Carlos Olarte García
Petty Officer First Class
Colombian Navy – General Maritime Directorate

Piston Core y Heat Flow A/B 5KLO - 2009



Previously investigation 2018

1
Requirements
Challenges

2
Better
Practices

3
Service

أرامكو السعودية
saudi aramco

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

NOGEPA
NETHERLANDS OIL AND GAS EXPLORATION AND PRODUCTION ASSOCIATION

Adriatic LNG

IL&FS | Environment

Natural Resources Canada

DANMARKS REDERIFORENING
Danish Shipowners' Association

Oil & Gas Authority

NSF National Science Foundation
WHERE DISCOVERIES BEGIN

USGS
science for a changing world

ResearchGATE
scientific network

EPA

frontiers in Earth Science

ASLO Association for the Sciences of Limnology and Oceanography

energies

OFFSHORE TECHNOLOGY CONFERENCE

TDI Brooks

Gardline

Gems®

FUGRO

"Consolidemos nuestro país marítimo"

2019 Program Components

Ministerio de Defensa Nacional
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1 Coring

Recover cores at 4000 meters depth

2 Geochemical Analysis

Basics
Fluorescence
Head Space
Gas chromatography
Light hydrocarbons (C1-C5)
High resolution
Diamondoids
Biomarkers and Isotopes

Advance in the knowledge and evaluation of the hydrocarbon potential, through the acquisition of new data to increase geological knowledge, and encourage investment of national and foreign risk in its search

4 Modeling / Sedimentology

Modeling
Petroleum Systems

Sediments
- Sedimentology
- Biostratigraphy
- Petrography

3 Heat Flow

Perform heat flow measurements to determine the thermal gradient of the sediment at 4000 meters depth

Schlumberger

FUGRO

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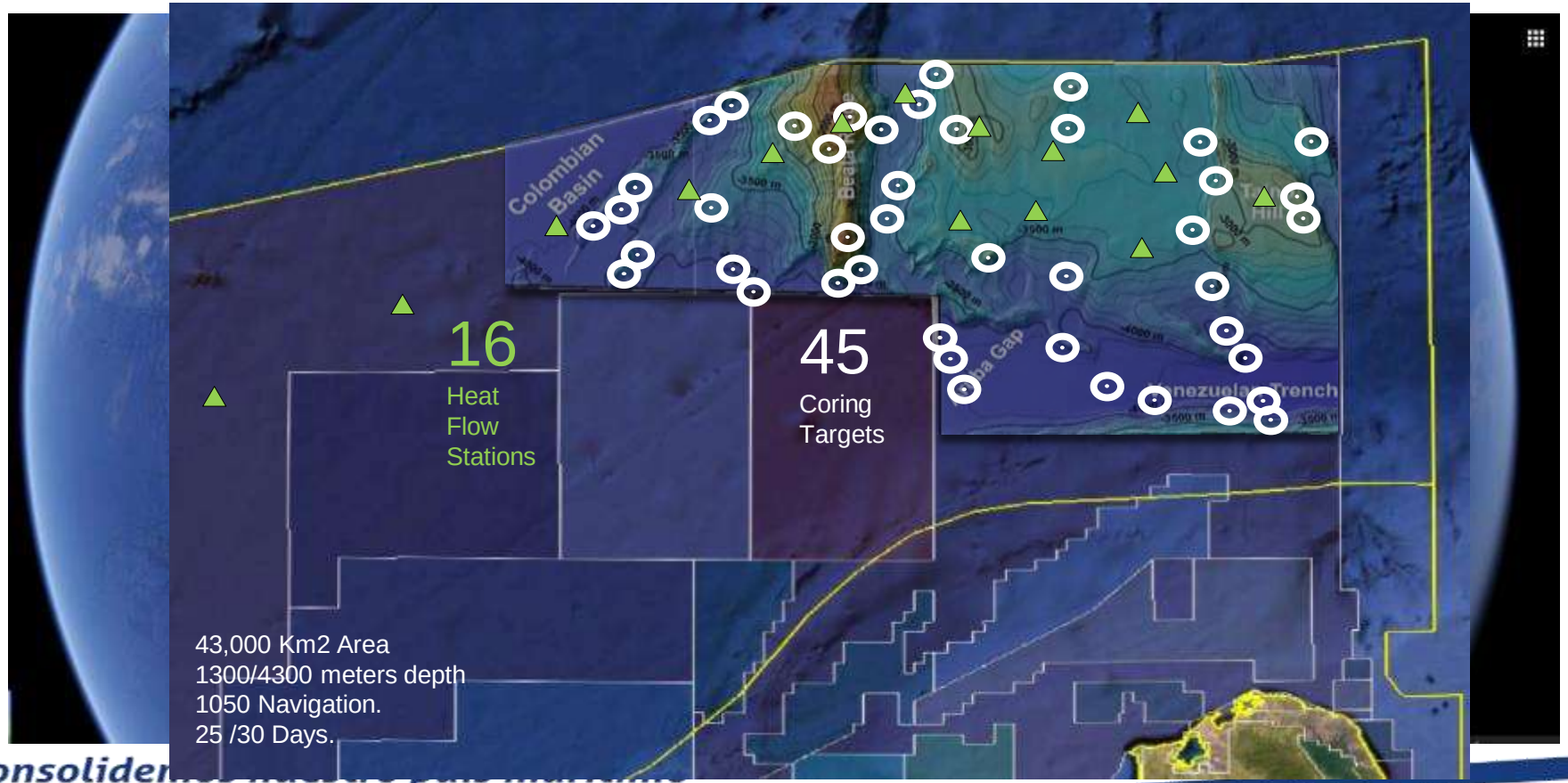
Exploration Area



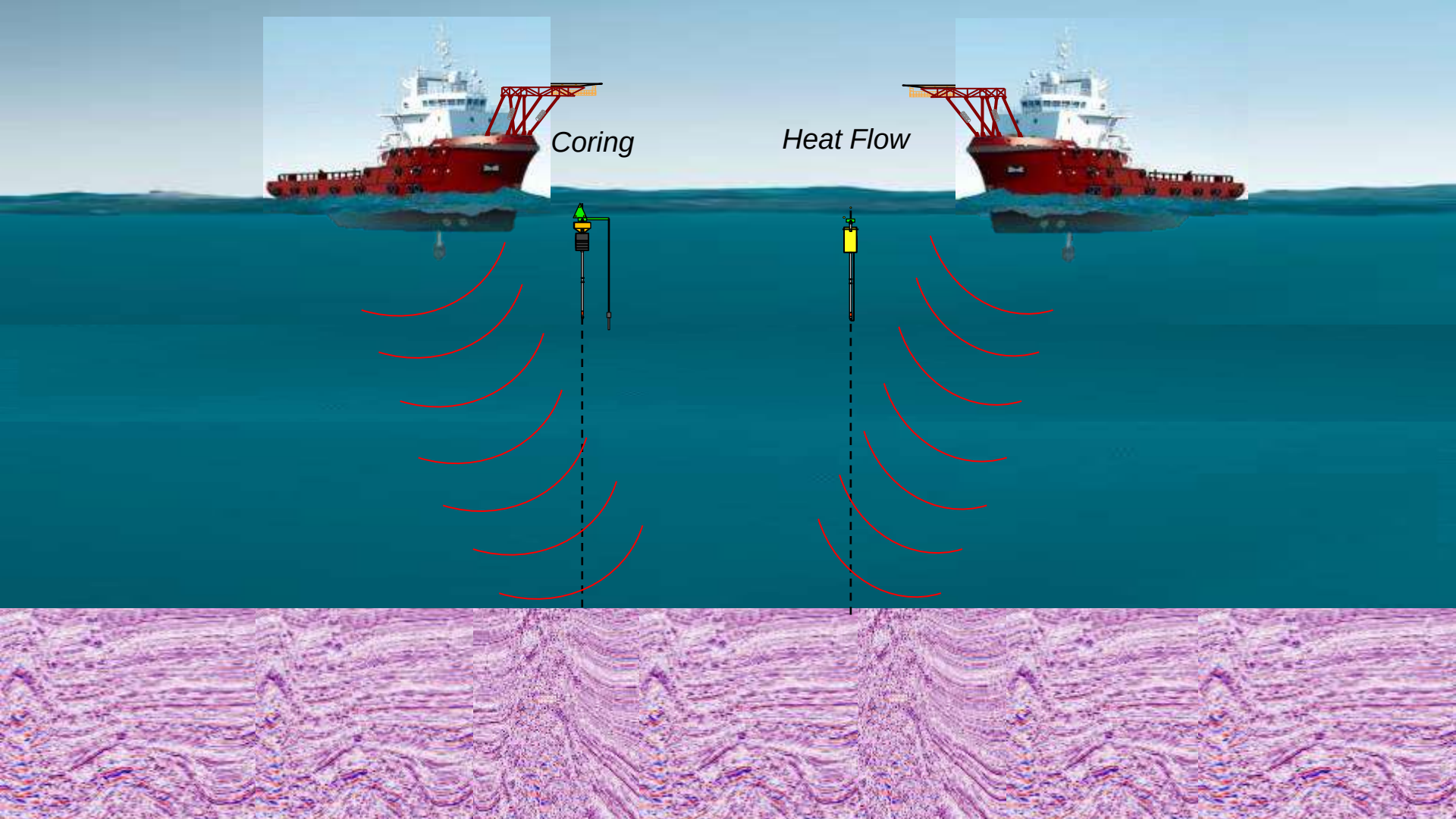
Research Vessel- **A.R.C. RONCADOR 5KMZ**

Capabilitites

Refrigerated Compartments
Residential spaces for scientists 10
Free area on deck (190 m2)
Classification Bureau Veritas, Special Service Research Vessel, Unrestricted Navigation, Inwatersurvey
DPS 1 Crane of 2.3 Ton
Speed: 10.0 kn.

Equipment:

1. *Dynamic positioning system type 1*
2. *USBL positioning system.*
3. *Retractable A-FRAME, hydraulic control for sample collection with Piston Corer.*
4. *Oceanographic winches with extension for 5000 m*
5. *Piston Corer sampler, 6 meters long.*
6. *Others that may be required.*
7. *Multibeam Echosounder shallow and deep waters up to 4000 meters.*
8. *Subbottom Profiler*


Coring
Heat Flow

Instalation and Test

Training and Practice

HSE

FUGRO



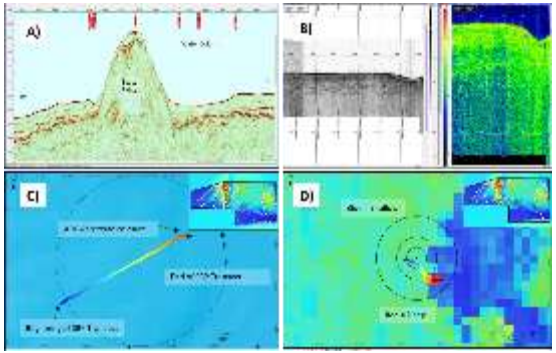





Launching and Recovering

Core Sample Description

Schematic core | Geochemistry | Archive



LOCATION (WGS 1984 UTM Zone 18N)						
Northing (m)	Easting (m)	Latitude N	Longitude W	Depth (m)	Mud Line (m)	Core Length (m)
1623154.03	670621.61	14°40'35.736"N	73°24'55.705"W	-2255.7	3	3

H_2S Odor	Gas Cut/ Fractured	Gas Hydrates	Oil/Oil Staining	Seep Fauna	Authigenic Carbonates
N	N	N	N	N	N

Core Description	Comments
Visible through liner –Silty clay to clay. Sticky material. Section 12: Soft sticky light greenish gray fine SILTY CLAY. Low water content. Homogeneous composition. Section 07: Soft and sticky light olive gray CLAY. Low water content. Homogeneous composition.	-

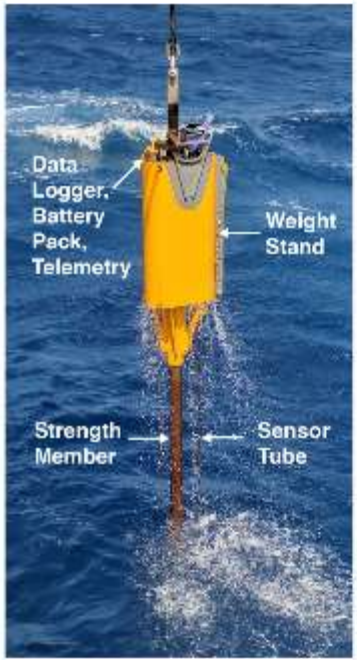
Foraminifera Lower Section

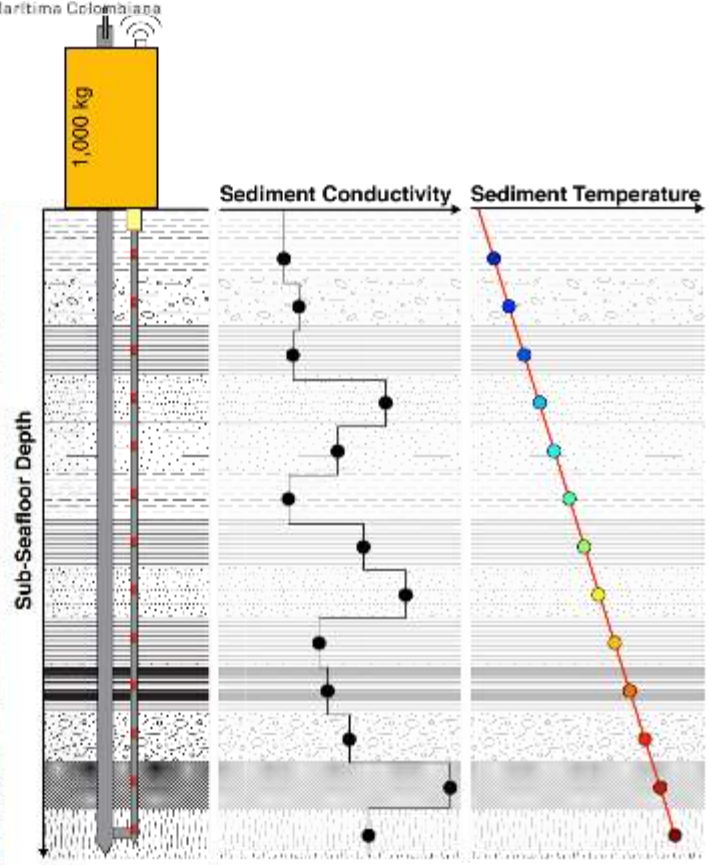
Section 12

Section 12

Core Cutter

Heat Flow Leg





11 thermistors (resolution 0.001 °C) measure temperature.

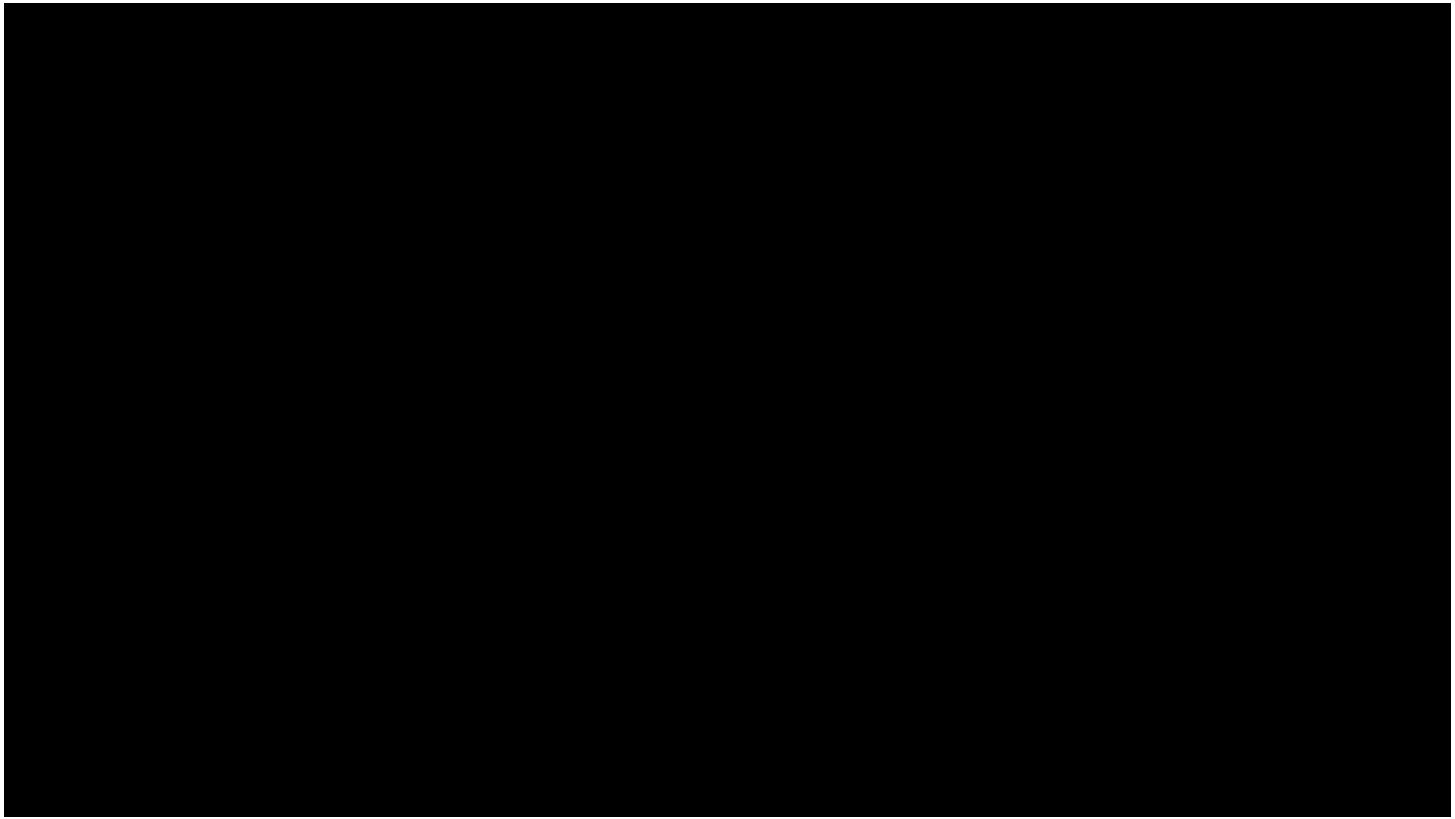
Calibrated heat pulse used to determine sediment thermal conductivity *in situ*.

Real-time data telemetry for operational efficiency.

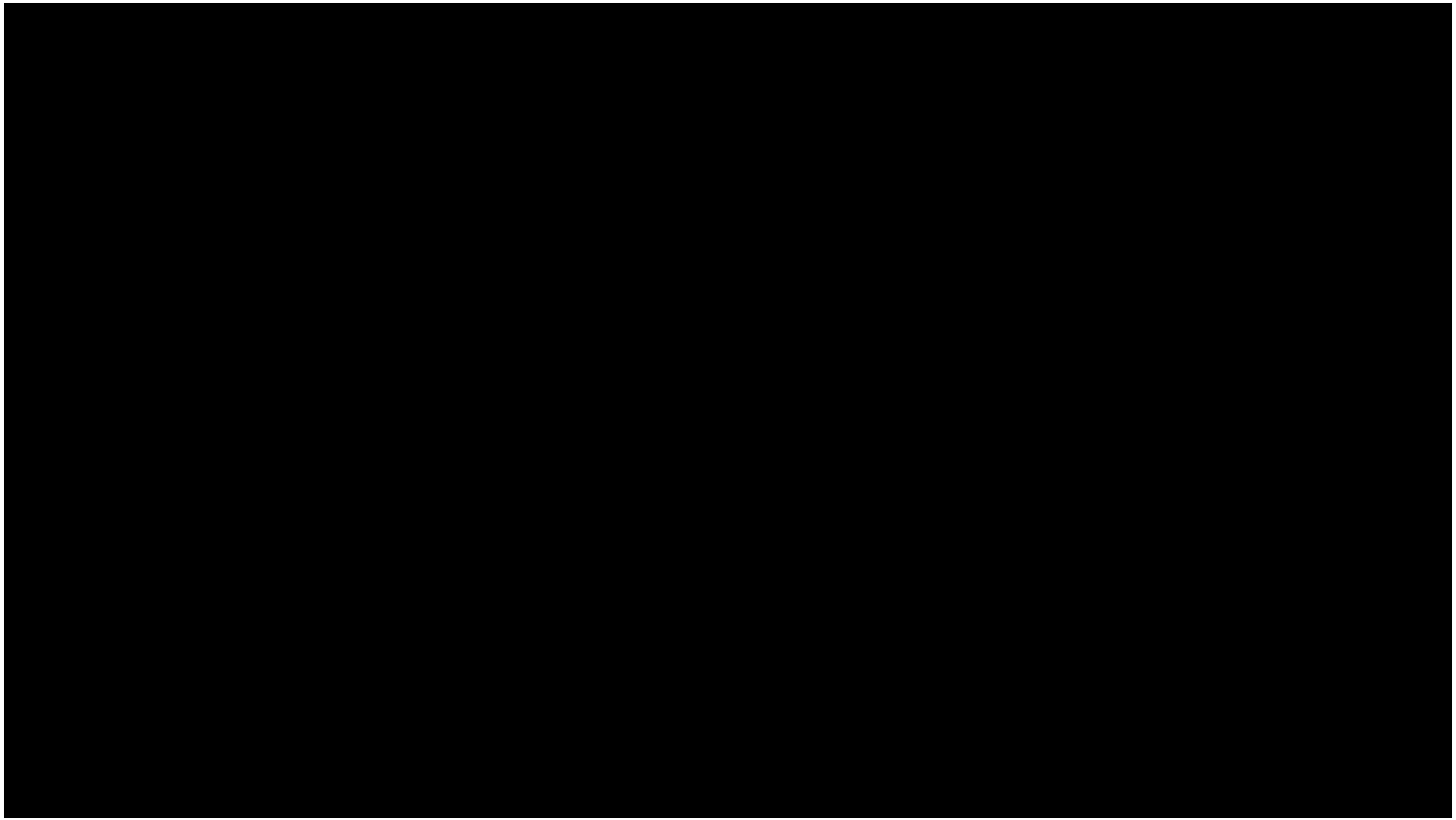
Operates autonomously or via topside control.

Capable of multiple measurements (20+) during any single lowering to the seafloor.

Launching and Recovering



Launching and Recovering

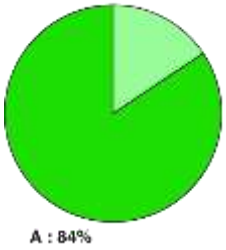


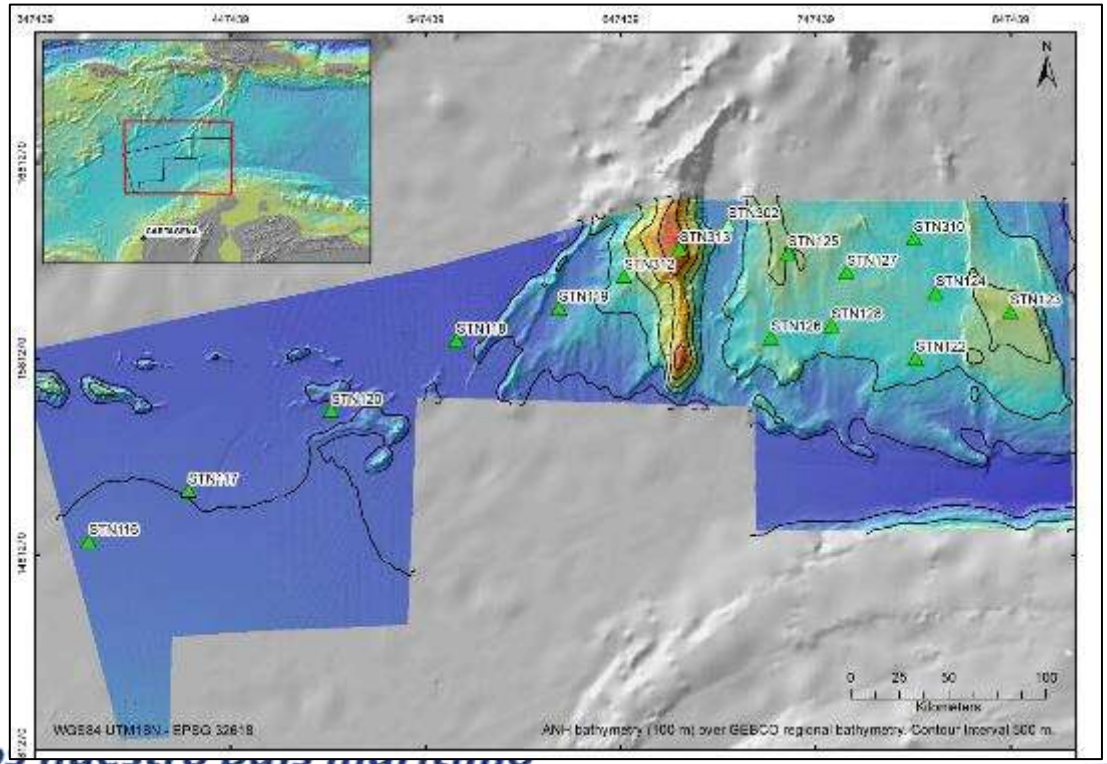
Launching and Recovering

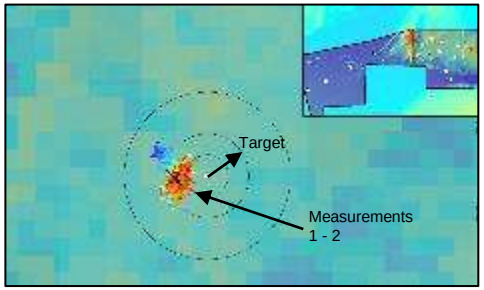
16 Stations **32** Measurements

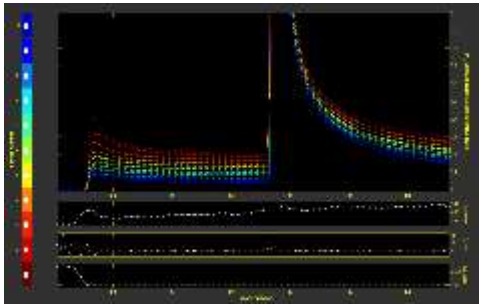
Penetration

Measurement Rank









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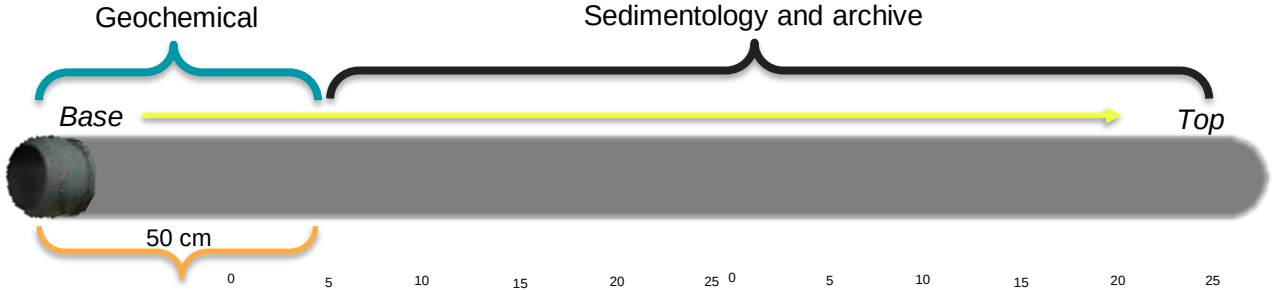
Geochemical Analysis

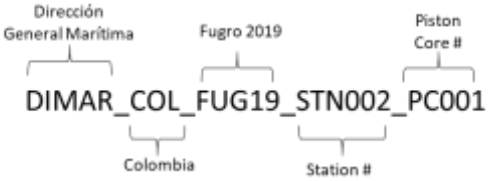
Basic Analysis

1. Light gas analysis (C1-C5) by GC-FID with Head-Space sampling system
2. Analysis of occluded gases (C1-C5) by GC-FID
3. Analysis of aromatic hydrocarbons by total fluorescence scanning (TSF)
4. Analysis of saturated aliphatic hydrocarbons (C15 +) by GC, Includes quantification of the UCM.

Specialized Analysis

1. Biomarker Analysis
2. Isotope Analysis
3. Diamondoids Analysis

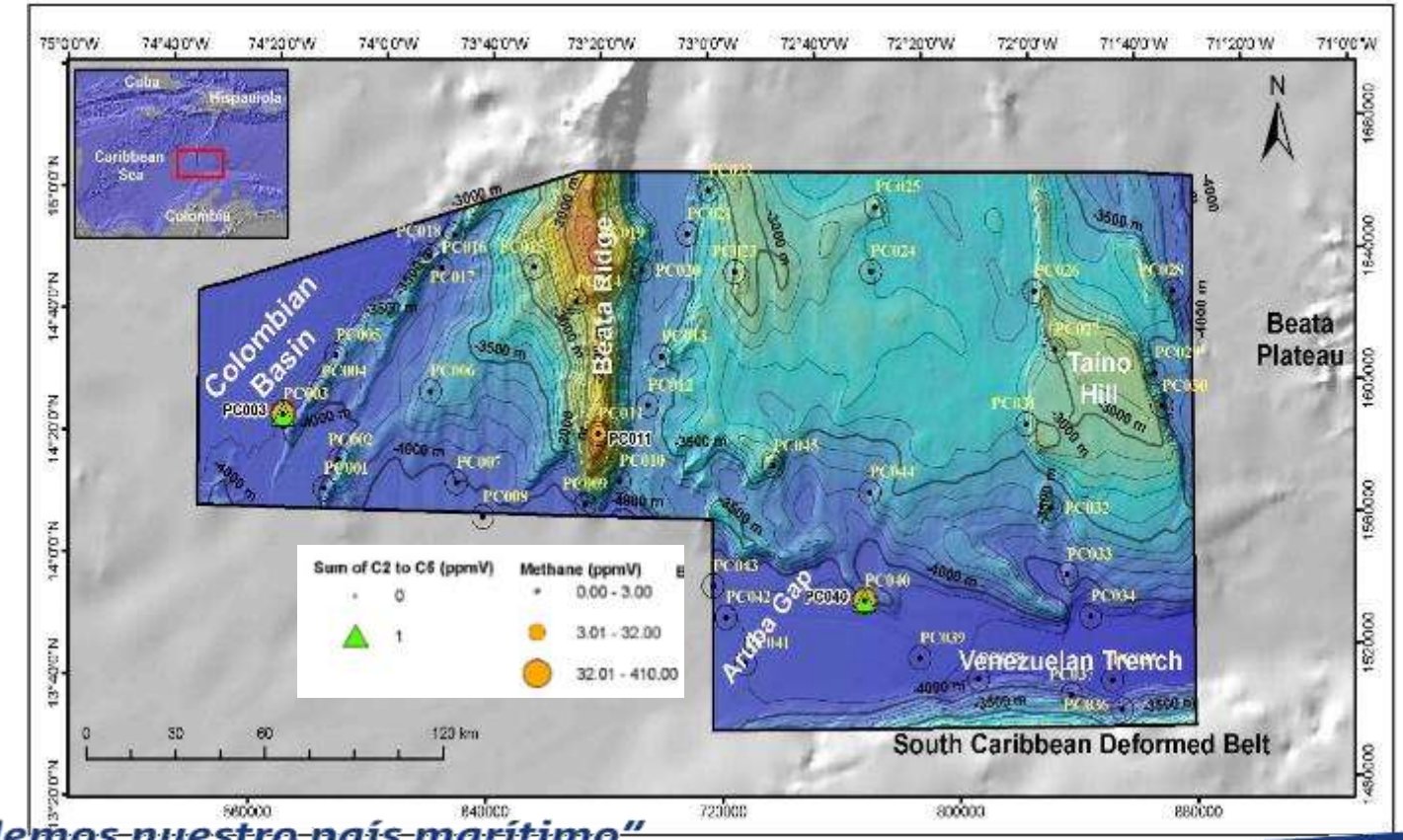




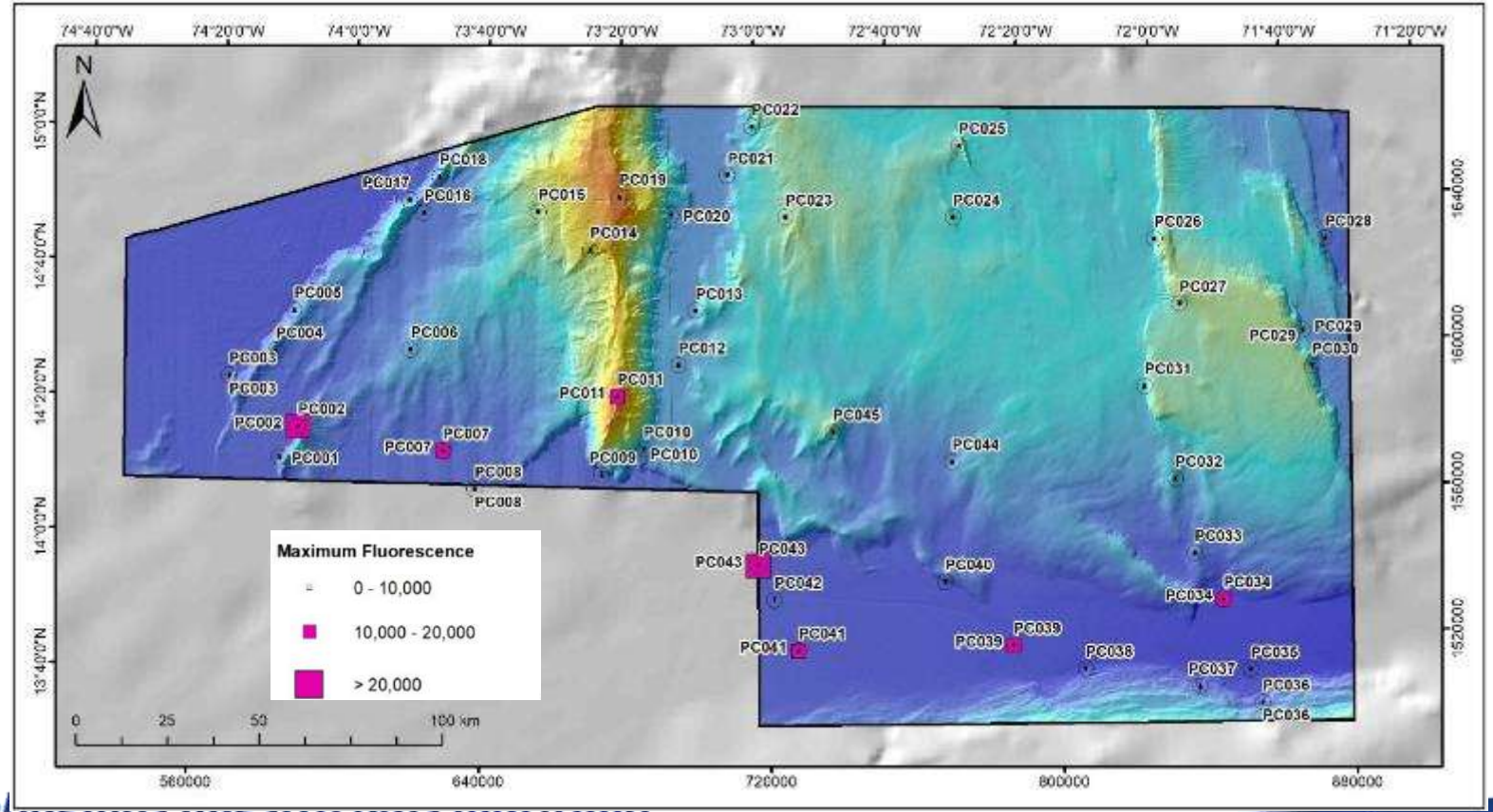
Can A & B = Shore Laboratory
Bag A & B = Shore Laboratory
Bag C = Onboard Laboratory

Geochemical Labs

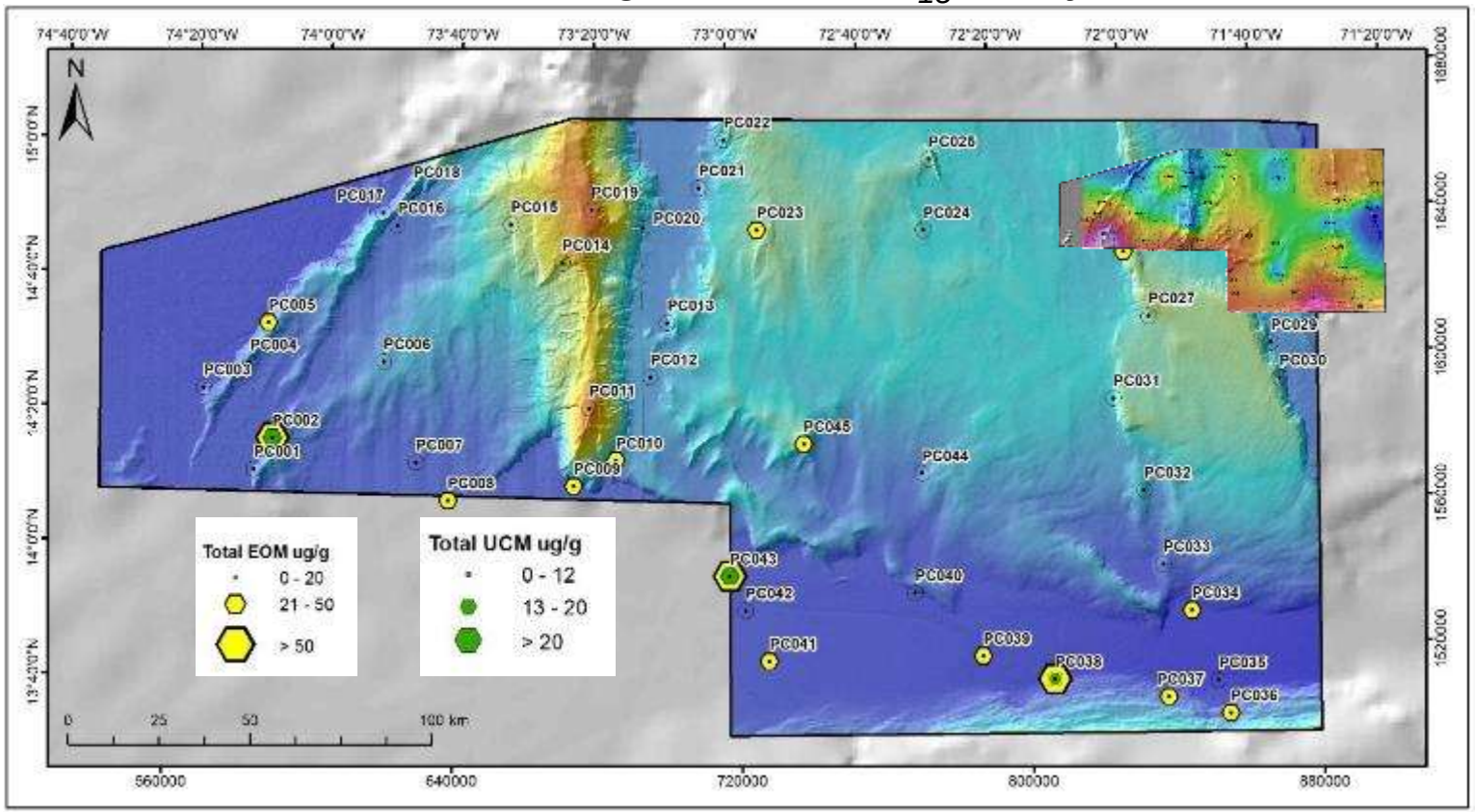
Map of headspace Gas Results for the survey area



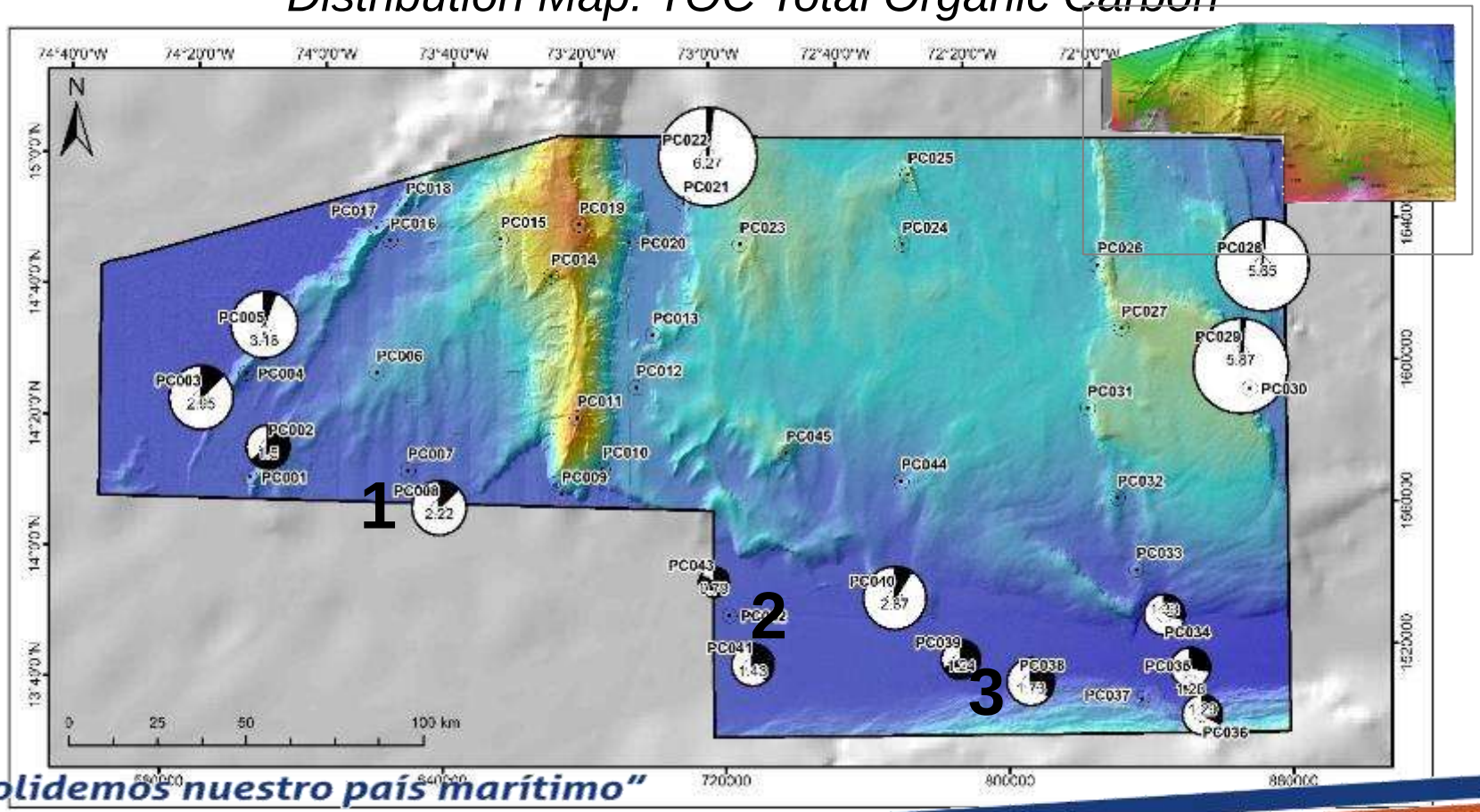
Total Scanning Fluorescence



Extractable Organic Matter C_{15+} Analysis

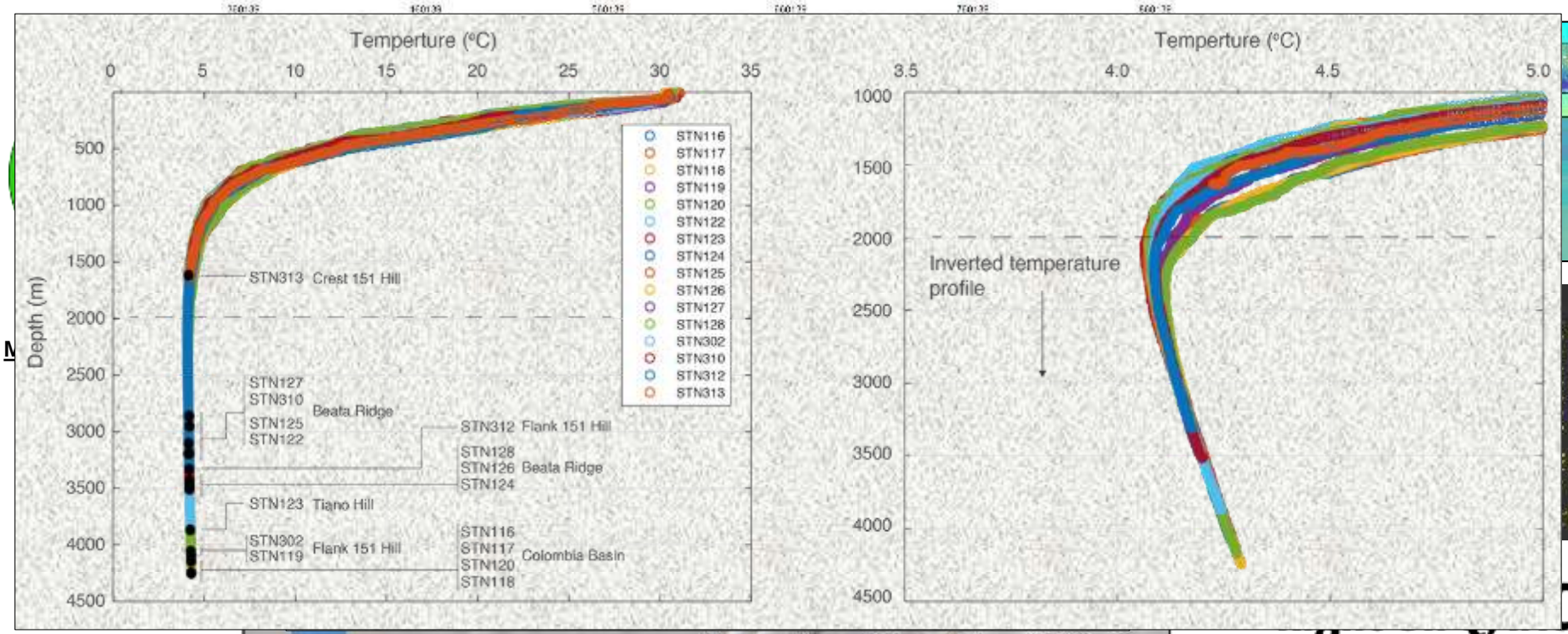


Distribution Map: TOC Total Organic Carbon



Heat Flow Stations

16 Stations **32** Measurements



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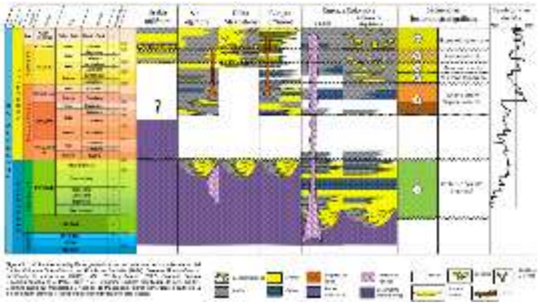
3D Modeling: Reference Report ANH 2015

[illegible]	[illegible]	[illegible]	Profundidad (pies) Tope	Profundidad (pies) Base
Plioceno	[illegible]	[illegible]	[illegible]	[illegible]
Mioceno tardío	[illegible]	[illegible]	[illegible]	[illegible]
Mioceno medio	[illegible]	[illegible]	[illegible]	[illegible]
Mioceno temprano	[illegible]	[illegible]	[illegible]	[illegible]
Oligoceno Temprano	[illegible]	[illegible]	[illegible]	[illegible]
Eoceno	[illegible]	[illegible]	[illegible]	[illegible]
Paleoceno	[illegible]	[illegible]	[illegible]	[illegible]
Cretácico Sec1	[illegible]	[illegible]	[illegible]	[illegible]
Cretácico Sec2	[illegible]	[illegible]	[illegible]	[illegible]
Cretácico Sec3	[illegible]	[illegible]	[illegible]	[illegible]
Espesor Total			**24.012 pies**	

Figura 7.2.1. [illegible]

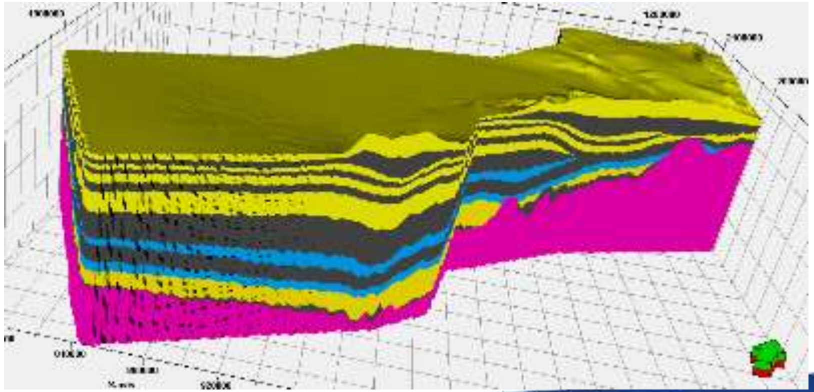


Modeling

Geological Ages

Name	Color	Geological age
Top_Plioceno		0.00
Top_Mioceno_Tardio		5.33
Top_Mioceno_Medio		11.63
Top_Mioceno_Temprano		[illegible]
Top_Oligoceno		[illegible]
Top_Eoceno		33.90
Top_Paleoceno		56.00
Top_Cretacico_Sec3		66.00
Top_Cretacico_Sec2		[illegible]
Top_Cretacico_Sec1		94.00
Top_Basamento		100.00
Model_Base		110.00

Plioceno_ss	
Plioceno_sh	
Mioceno_tardio_ss	
Mioceno_tardio_sh	
Mioceno_Medio_ss	
Mioceno_Medio_sh	
Mioceno_temprano_ss	
Mioceno_temprano_sh	
Oligoceno_sh	
Oligoceno_cal	
Eoceno_sh	
Paleoceno_sh	
Cretacico_Sec3_cal	
Cretacico_Sec2_ss	
Cretacico_Sec1_sh	
Basamento	



Quality Control 3D Modeling

COL-ANH-2012-18

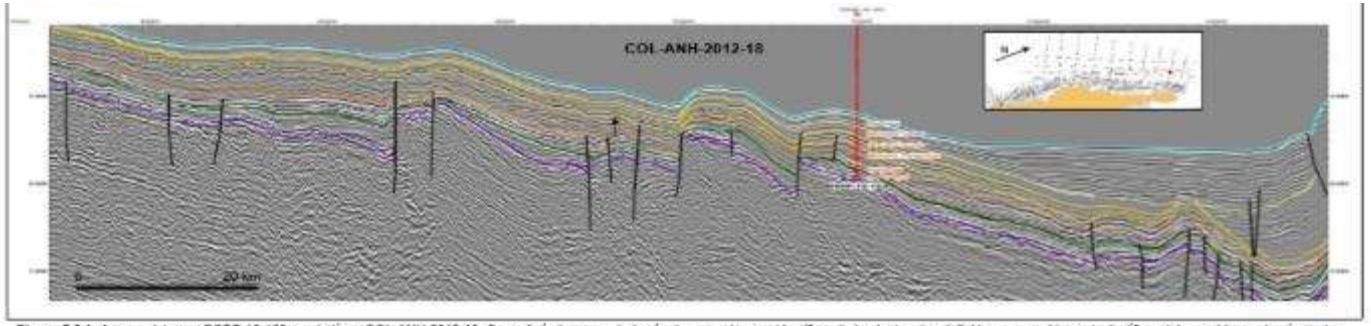
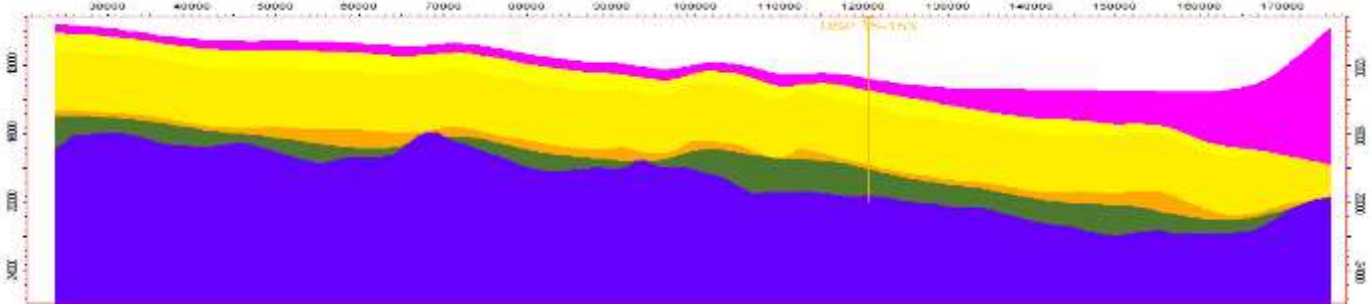
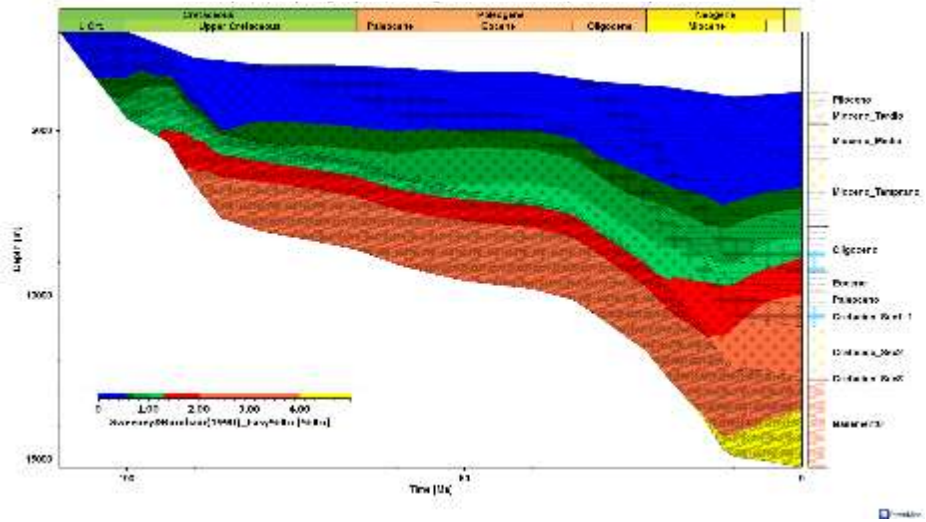


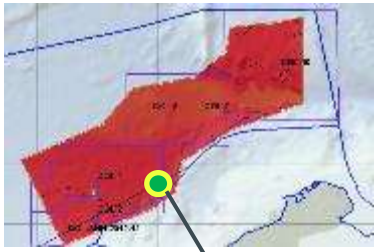
Figura 7.2.1. Amarre del pozo DSDP 15-153 con la línea COL-ANH-2012-18. Se realizó el amarre de la sísmica con el pozo, identificando los horizontes definidos por cambios estratigráficos (observables en la sísmica) y litológicos (informe del pozo DSDP 15-153) como son: basamento, Cretácico Tardío (descrito como la superficie "B" en el pozo), Secuencia II (Oligoceno), Secuencia III (Mioceno temprano), Secuencia IV (Mioceno medio), Secuencia V (Mioceno tardío) y Secuencia VI (Plioceno).



Petroleum System - Thermal Maturity

- Location 1D Model





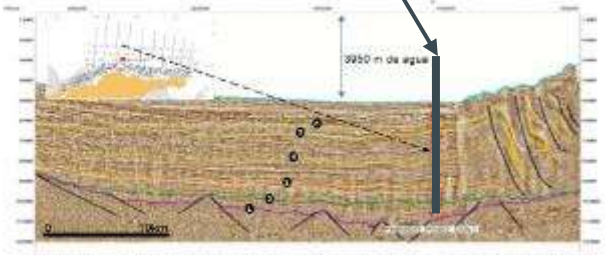
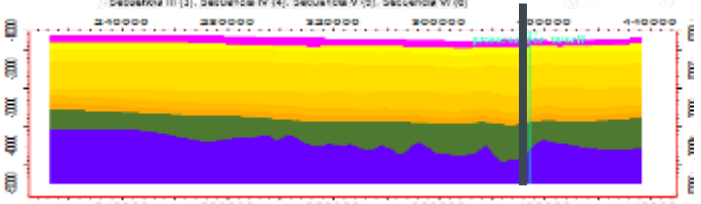
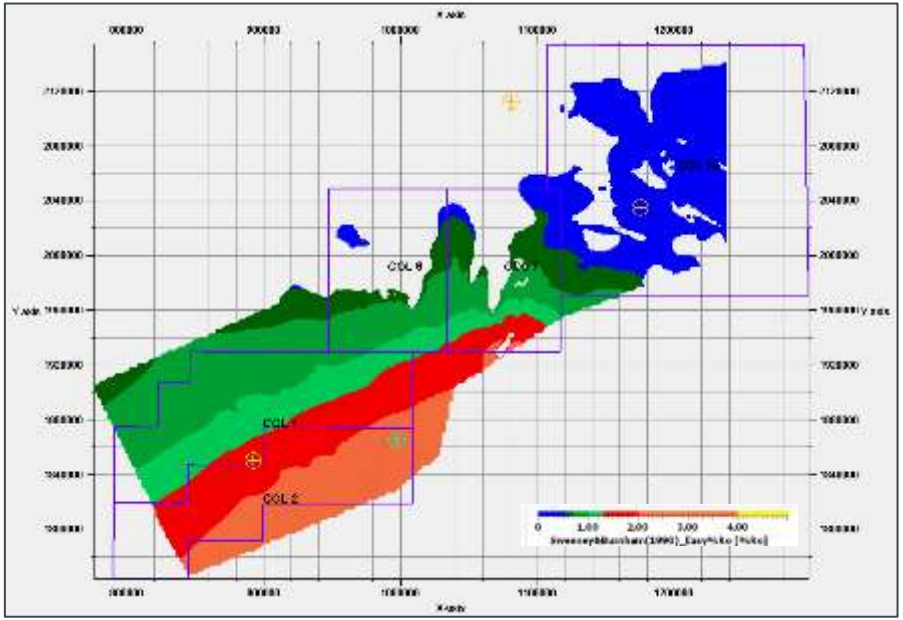


Figura 7.2.8. Ubicación del Pseudopozo sobre la Línea COL-ANH 2012-11: basamento (1), Secuencia I (2), Secuencia III (3), Secuencia IV (4), Secuencia V (5), Secuencia VI (6)

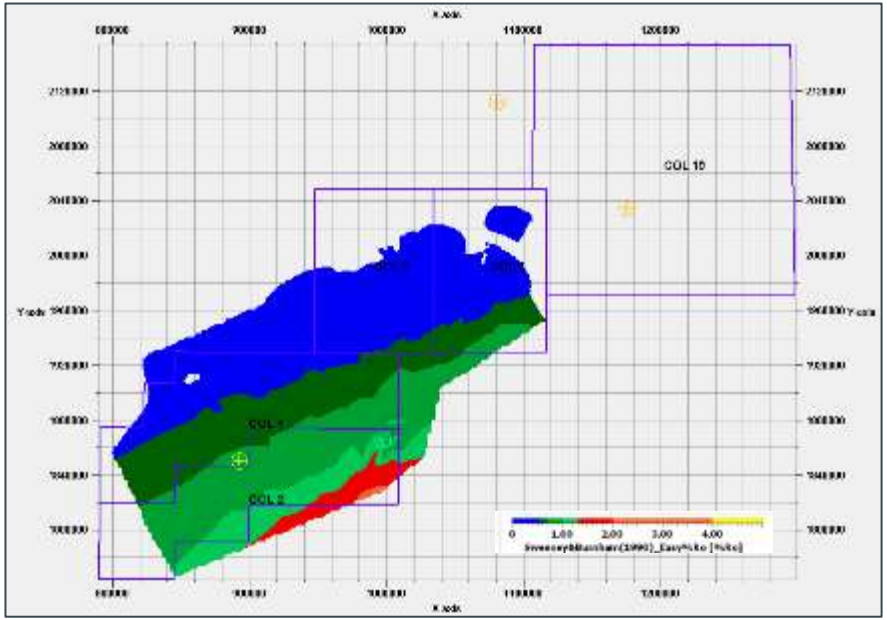


Petroleum System - Thermal Maturity

Cretaceus

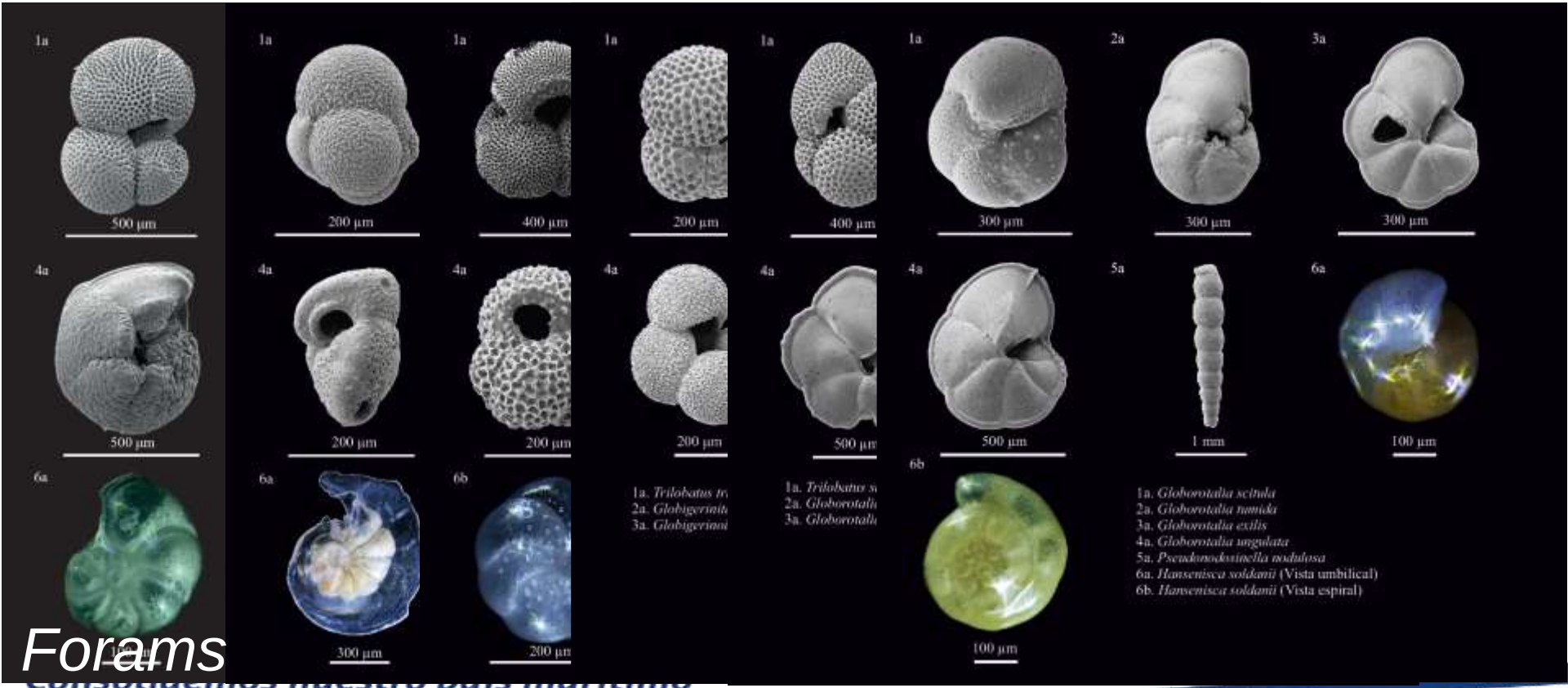


Oligocen



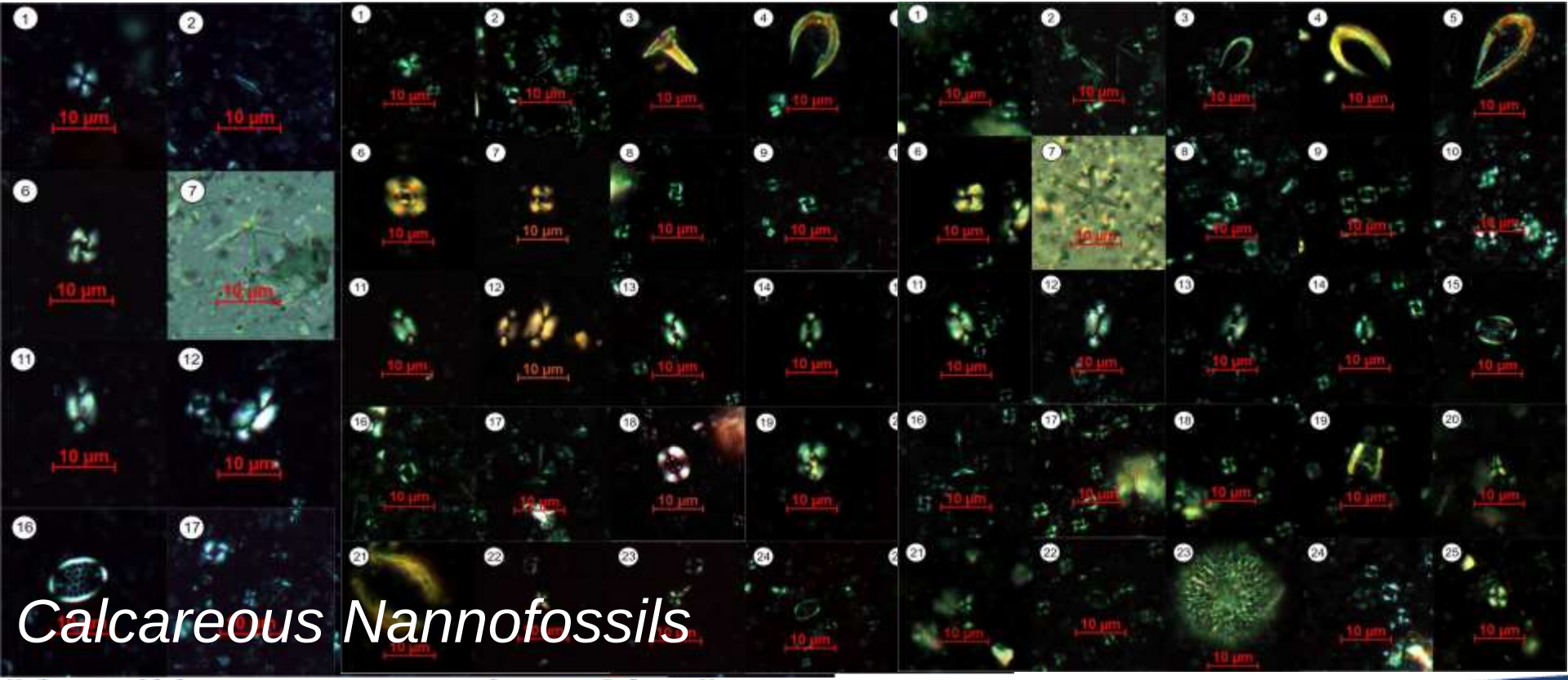
Sedimentology Bioestratigraphy and Petrography

Bioestratigraphy

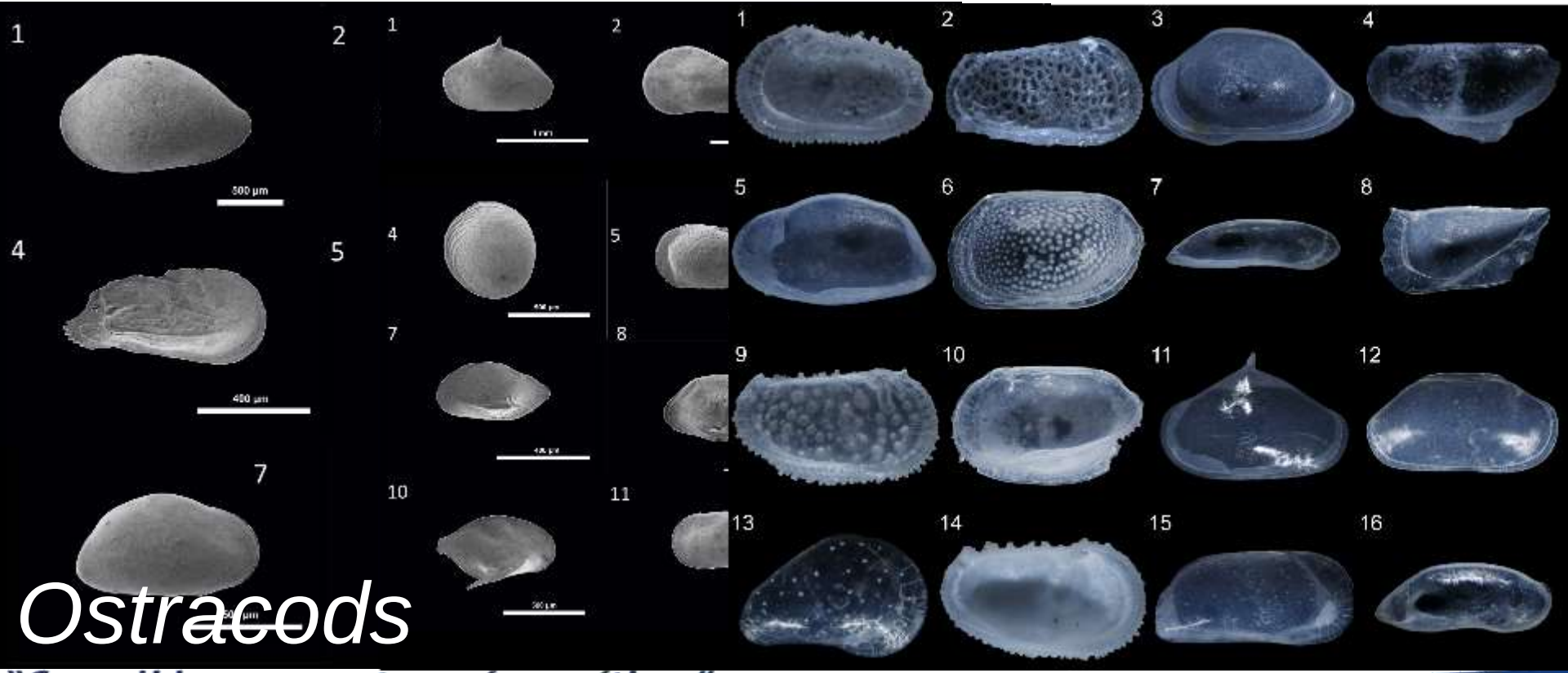


Forams

Bioestratigraphy



Bioestratigraphy



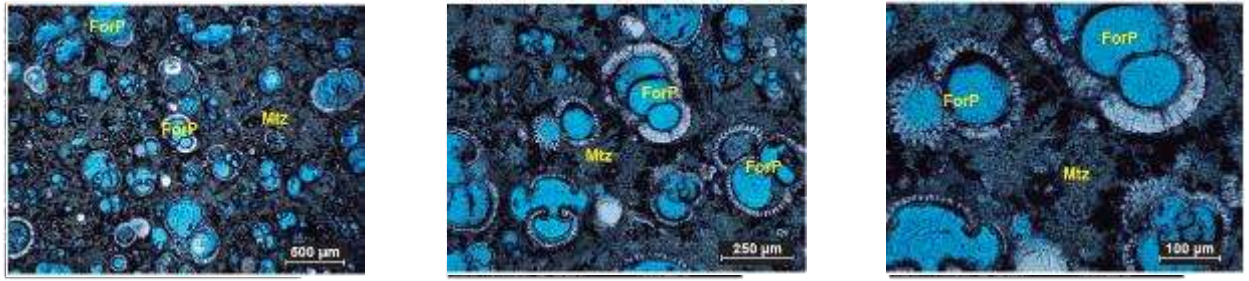
Ostracods

Bioestratigraphy

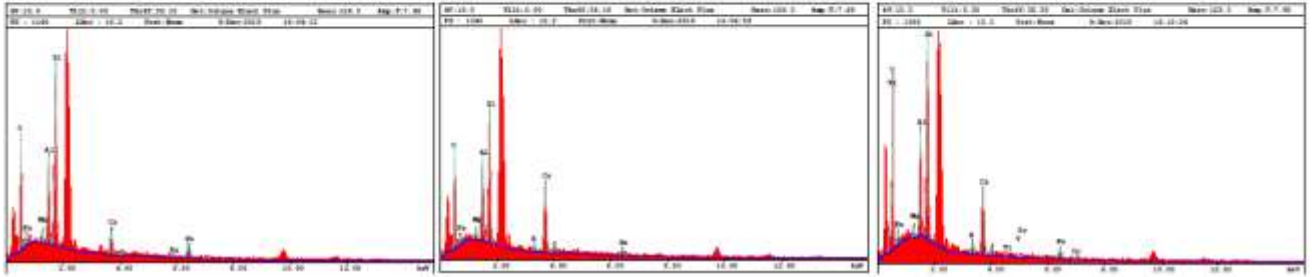
Dinoflagellates

Petrography

Scanning electron microscope



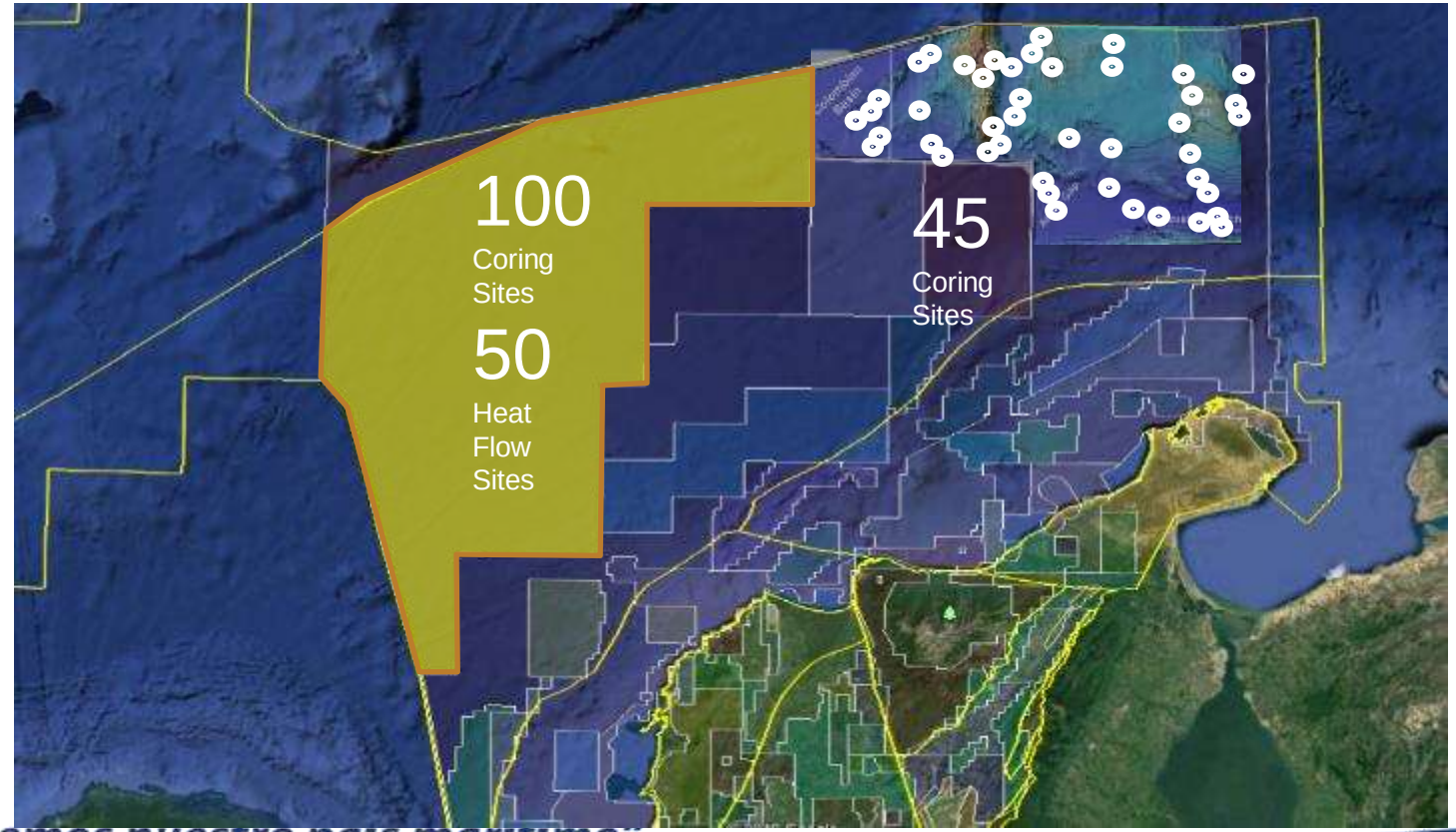
X Ray Análisis applying Dispersive Energy



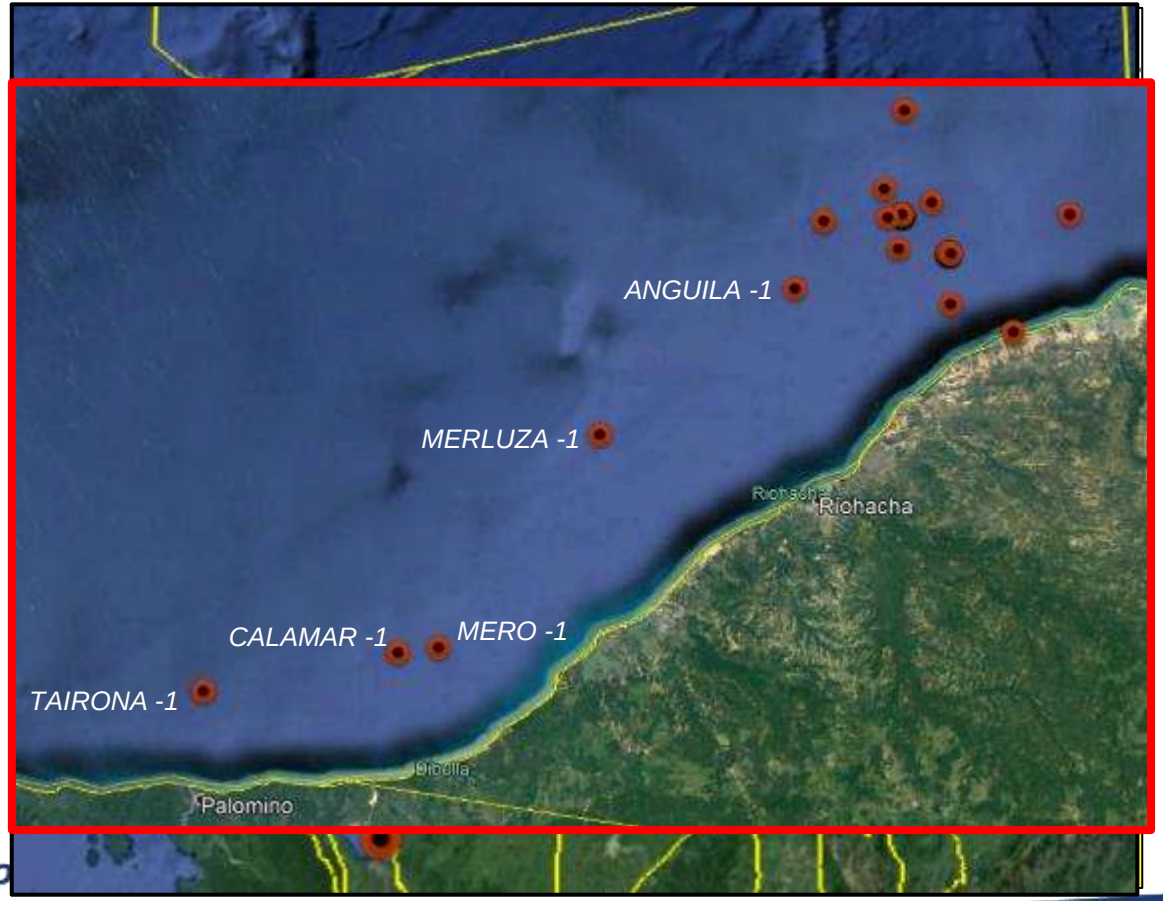
Mainly made up of planktonic foraminifera (ForP) in a lesser proportion, benthic foraminifera (ForB) and indeterminate fossil fragments (FFI), clay matrix (Mtz) and accessory minerals.

EDAX presents a histogram indicating peaks of Si, Ca, Al, Mg, Na, K, Fe, related to illite-smectite type clay. On the other hand, traces of rare earth elements such as Terbium (Tb) and Praseodymium (Pr) are observed.

Coming on July 2021



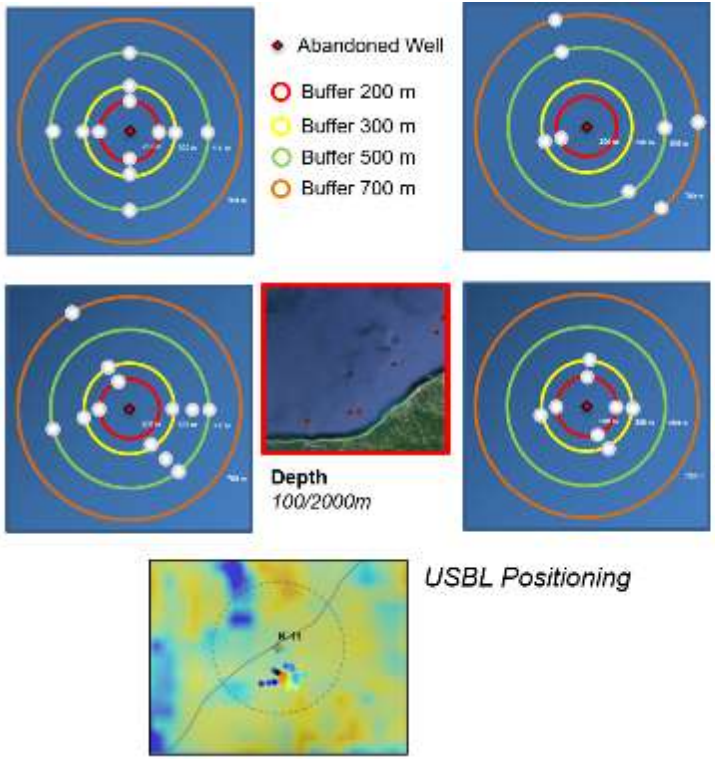
Coming on September 2021



- ***Abandoned Wells***
- ***--- 2000 m Isobat***

1- TAIRONA-1979
2- CALAMAR-1982
3- MERO-1983
4- MERLUZA-1989
5- ANGUILA-1989

Coming on 2021-2022



USBL Positioning

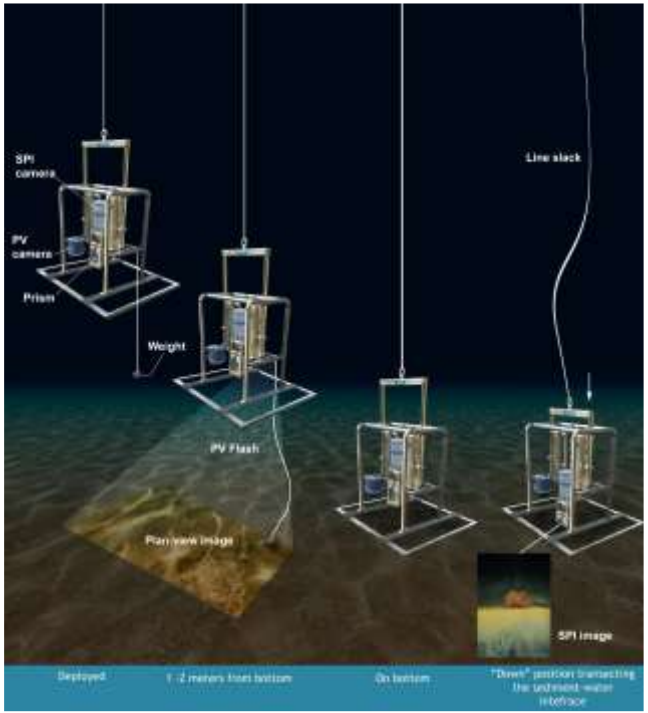
Water Samples

Analysis Type	Key Analytes
Metals	Lead (Pb), Cadmium (Cd), Mercury (Hg), and Beryllium (Be)
Inorganics	Total Nitrogen, Total Phosphorus
Other	Suspended solids, Total Dissolved Solids

Superficial Sediment Sample

Analysis Type	Key Analytes
Metals	Lead (Pb), Cadmium (Cd), Mercury (Hg), Beryllium (Be)
Organics	PAH, Total Organic Carbon (TOC), Total Petroleum Hydrocarbons
Other	Total Nitrogen, Total Phosphorus, Grain Size, Sulfate, Redox Potential (Eh),

Drop Camera



Conclusion

“The union of state organizations, supported by experts, can generate benefits for a Government, facilitating decision process, securing economical investment for citizens and multiple industries.Thru this model countries can produce invaluable and high-quality information for science and contribute to the understanding of their territory and its resources”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